STEM CELL THERAPY FOR ORTHOPAEDIC DISEASES

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Stem cells are widely known for its availability to differentiate into many specialized cells in our body, and yet, the best formula to maximize its potential still under research. The aims of stem cell therapy and tissue engineering are summarized into the 4Rs: Repair, Restore, Rejuvenate, and Replace. Nowadays, stem cell based therapy are studies in orthopedic regenerative medicine, especially for the case where the conditions or injuries have limited therapeutic option and usually have a chance to get a benefit from developing technologies in regenerative medicine.

Mesenchymal stem cells (MSCs) are stem cells of mesenchymal origin and are undifferentiated cells with high proliferative capability, capable of self-renewal, multi-lineage differentiation and tissue regeneration. However, MSCs have varying degrees of differentiation potential and interaction with other cell types and components of the extracellular matrix are believed to influence the survival and development of MSCs to the committed lineage such as bone and cartilage. These cells have the potential to rebuild injured tissue and secrete growth factors to enhance tissue regeneration. Promising results were reported from *in vitro* studies, animal studies, and clinical trials in the field of bone, cartilage, tendon, and ligament repair. The application of MSCs itself varies from simple mesenchymal injection up to more complex tissue engineering. Larger defects usually require a more complex